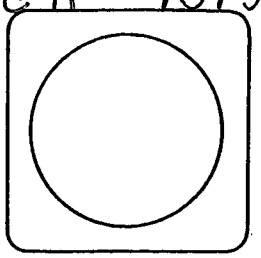
EARTH SATELLITE CORPORATION
(EarthSat)



1747 PENNSYLVANIA AVENUE, N.W., WASHINGTON, D. C. 20006
TELEPHONE: (202) 223-8100 TELEX: EARTHSAT64449

May 8, 1973

National Aeronautics and Space
Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Distribution

RE: Type I Progress Report - New Jersey
Coastal Mapping: NAS5-21765

Gentlemen:

The New Jersey Department of Environmental Protection and Earth Satellite Corporation are pleased to submit a Type I Progress Report for the two month period ending April 30, 1973.

A. TITLE: Application of ERTS-1 Data to the Protection and Management of New Jersey's Coastal Environment (SR #304).

B. PRINCIPAL INVESTIGATOR: Mr. Roland S. Yunghans, New Jersey Department of Environmental Protection

C. CO-PRINCIPAL INVESTIGATORS: Dr. Edward B. Feinberg, New Jersey Department of Environmental Protection
Dr. Frank J. Wobber, Earth Satellite Corporation

D. CO-INVESTIGATOR: Mr. Robert L. Mairs, Earth Satellite Corporation

E. PRINCIPAL CONTRIBUTORS: Mr. Dennis Woodward, Earth Satellite Corporation
Mr. David A. Thibault, Earth Satellite Corporation
Mr. Robert T. Macomber, Earth Satellite Corporation

F. OBJECTIVES OF INVESTIGATION:

- to develop useful information products from ERTS-1 monitoring of tidal and nearshore circulation and sedimentation
- to apply these products to the management and protection of New Jersey's coastal zone, and facilitate allocation of funds in shore protection, planning, etc.

- to estimate benefits from ERTS to the New Jersey Department of Environmental Protection

G. SUMMARY OF ACCOMPLISHMENTS: The primary accomplishments during this two month period of the experiment are summarized on the following pages by phase. The most significant accomplishments during the reporting period were: Major progress in the preparation of an information products folio and the completion of the major surface truth field effort. Accomplishments are detailed by task in the TASK STATUS REPORT (Appendix A).

PHASE I: PRE-LAUNCH PREPARATION

- All Pre-Launch preparation tasks have been completed except for those of a continuing type. The major ground and aerial survey effort which was conducted as part of the First Look Analysis Phase because of early delivery of ERTS-1 data, unfavorable winter weather conditions, and to coordinate with a complementary Federal program in the New York Bight Area was completed in April 1973.

PHASE II: FIRST LOOK ANALYSIS

- A folio of information products is nearing completion for distribution within the NJDEP. Preparation of the folio has been delayed due to changes in the structure of NJDEP and the need to complete Pre-Launch studies simultaneously with First Look activities.

- A photomap of New Jersey's Coastal Area as defined in the "Major Coastal Area Facility Review Act" has been prepared using MSS band 7 for the coastal area and MSS band 5 for the remaining portion of the state. The map was produced for state distribution and internal use.

- Imagery having portions of the coastal zone cloud-free have been obtained for five (5) additional orbits: February 12, 13; March 2, 20, 21.

- Manual and machine assisted analysis is being performed upon receipt of ERTS data. These analyses are on file and are used in the continuing analysis of new image sets as they are received.

- The major ground truth effort was completed on April 7, 1973 during an ERTS-1 overpass.

H. SIGNIFICANT RESULTS

- New Jersey's planned, regionalized network of sewage disposal facilities has been plotted on an ERTS-1 mosaic and circulation parameters for each of the planned outfall locations have been analyzed using the ERTS-1 imagery and comparative aircraft photography. These data are plotted on an ERTS-1 photomap.

- An ERTS-1 information product has been prepared comparing the New Jersey coasts erosional characteristics (critical vs. non-critical) to beach ownership (federal, state, local, and private).

- An ERTS-1 information product is nearing completion illustrating the predominent destructive wave approaches to state coastal geomorphology.

- Work is continuing on the circulation and dispersion of barge-dumped wastes in the New York Bight area.

- One of the largest remote sensing experiments ever attempted in this country was completed on April 7, 1973 during an ERTS-1 overpass. The test area included the northern portion of New Jersey and the Raritan Bay - New York Harbor area. Three NASA aircraft, two helicopters, nine surface vessels (six of which were coordinated through the NJDEP Marine Police), 40 ground team personnel, and numerous oceanographic, radiometric and meteorological equipment were deployed in an effort to characterize the surface and near-surface circulation dynamics in this 600 square mile area, during an entire tidal cycle. The analyses of these data in concert with all previous ERTS-1 overpasses will provide NJDEP with information that can lead to a better and more rational use of the nearshore marine environment. NJDEP will utilize the data in planning future outfall locations, regulating offshore disposal of wastes, etc.

I. PROBLEMS: NONE

J. RECOMMENDATIONS FOR TECHNICAL CHANGES:

As discussed in the Data Analysis Plan, submitted during this reporting period, some changes have been made in the thrust and timing of this experiment. During proposal preparation both NJDEP and EarthSat anticipated that information products could be promptly identified and routine distribution could be made within the NJDEP. Routine distribution was viewed as monthly or bi-monthly deliveries.

As interviews were held with numerous state offices it was determined that "routine" (monthly or bi-monthly) deliverables had less value to meet operational state needs than semi-annual or annual deliverables with updates on a six to twelve month schedule. Furthermore, the development of an information base from which working products could be made, was not

available in the state and required the analysis of successive ERTS-1 overpasses during several seasons of the year. The acquisition of this information base will more than justify the utility of ERTS-1 to NJDEP and lead to many products in years to come. EarthSat now has that information base and is now in the process of producing several information products that will provide more useful information than was possible during the early stages of the experiment and which may facilitate more routine product delivery. These products; as explained in Section H, (Significant Results) and other products, that are in the analysis process, will be tested by NJDEP data sources to ensure their utility for the regulation, protection, and management of New Jersey's Coastal Zone.

K. CHANGES TO STANDING ORDER FORMS: NONE

Sincerely yours,

Roland S. Yunghans

Roland S. Yunghans
New Jersey Department of Environmental Protection

Frank J. Wobber / by RSY

Frank J. Wobber
Director
Geosciences and Environmental Applications Division
Earth Satellite Corporation

RSY/FJW/rlt

APPENDIX A

TASK STATUS REPORT

(Reference: Contract NAS5-21765)

5

TASK	HEADING	STATUS	COMMENTS
		PHASE I	
3.1.1	Determine existence of Pre-ERTS imagery for analysis	Completed 10-1-72	Visits made to NASA MSC (Earth Resources Aircraft Data Bank) at Houston, Texas. A catalog of aircraft imagery has been prepared and delivered to NJDEP for use by state offices.
3.1.2	Assemble ERTS Data Analysis Equipment	Completed 9-1-72	NJDEP has acquired basic imagery analysis equipment at Trenton, New Jersey.
3.1.3	Analyze Pre-ERTS imagery set as a demonstration of technique	Completed 10-1-72	ERTS-1, Apollo, and aircraft imagery and their analysis were used to brief NJDEP officials. A manual for reference by state representatives was prepared and distributed.
3.1.4	Organize and conduct preliminary briefing with NJDEP	Completed 10-5-72	Briefing was held at NJDEP to demonstrate remote sensing techniques and possible products to be developed from ERTS. A manual for reference by state representatives was prepared and distributed.
3.1.5	Select candidate test sites	Completed 11-15-72	The Northern New Jersey Shore will be the primary test site with secondary test sites to be studied as NJDEP interest, or environmental problems arise.
3.1.6	Collect and organize existing ground truth data.	Completed 12-1-72	A bibliography has been prepared. Collection of pretinent ground truth will continue throughout experiment. These data will be delivered to NJDEP.
3.1.7	Perform reconnaissance of test area.	Completed 2-15-73	The Northern Test Area was visited the week of 2-12-73. Contact was established with a variety of Federal and industrial groups.
3.1.8	Develop final interview plan and conduct interviews.	Completed 12-10-72	Interviews with key personnel in early December have led to initial plans for information products. Subsequent briefings after initial products are prepared will be needed. EarthSat will work closely with NJDEP in using the products.

TASK	HEADING	STATUS	COMMENTS
3.1.9	Prepare ground truth collection plan	Completed 3-1-73	A multi-agency cooperative ground ground truth effort was planned for the period April 6-13, 1973
3.1.10	Instrument test sites	Completed 4-7-73	Instrumentation (current meters, transmissometer, spectraradiometers, temperature recorders, PRT-5, tide gauge, etc.) was initiated in late March 1973 and was completed for the Northern Test area on April 7, 1973.
3.1.11	Prepare aerial survey plan	Completed 4-7-73	Five aircraft collected suplementary data over test site during ground survey effort on April 7, 1973; the NASA JSC C-130, NASA Wallops C-54, University of Michigan C-47, and two helicopters.
3.1.12	Collect ground truth data	Completed 4-7-73	Preliminary field sampling was accomplished during reconnaissance survey and extensive sampling was completed during the April 7, 1973 effort.
3.1.13	NJDEP shall assemble equipments specified in 3.1.9 at (Toms River Facility)	Underway	NJDEP personnel and equipments were made available and used during 4-7-73 ground survey effort. Personnel and equipment were coordinated from Mammouth Beach Marine Police Station.
3.1.14	Prepare line base maps for test area using simulated ERTS imagery.	Underway	Due to the compression of Phase I and the early receipt of ERTS-1 imagery, maps are being prepared using ERTS data.
3.1.15	Use simulated ERTS imagery for candidate base maps.	Underway	A folio of candidate ERTS-1 products is presently being assembled. The folio includes analytical maps for shore protection planning, ocean outfall placement, and effects of barge-dumped waste disposal.
3.1.16	Develop and conduct Preliminary Cost-Benefits Analysis	Underway	A preliminary methodology is being developed as a result of the initial interview. This task has been delayed until information products are tested by NJDEP.

TASK	HEADING	STATUS	COMMENTS
3.1.17	Brief NJDEP on use of candidate information products	Pending	
3.1.18	Establish letter contacts with other States	Pending	
3.1.19	Prepare plan for analysis of ERTS imagery	Completed 10-1-72	Due to compression of Phase I, initial analysis plan for ERTS Imagery was established during initial briefings with NJDEP.
	PHASE II		
3.2.1	First look analysis of first imagery	Completed 9-29-72	First look analysis documented in first NASA progress report.
3.2.2	Analyze all ERTS imagery during Phase II	Underway	Documented analysis in progress reports.
3.2.3	Analyze all ERTS imagery during Phase II by spectral band	Underway	Documented analysis in progress reports.
3.2.4	Map coastal landforms and outline the wetlands	Completed 3-1-73	A coastal wetlands map at 1:500,000 has been prepared.
3.2.5	Use optical analysis equipment, & enhancement techniques in analysis of ERTS imagery	Underway	This is a continuing Task and will be underway throughout the experiment. Equipment includes, I^2S Digicol, I^2S Addcol, Bausch & Lomb ZTS, MacBeth Densitometer, etc.

TASK	HEADING	STATUS	COMMENTS
3.2.6	Review and finalize information distribution within NJDEP	Underway	An initial distribution network has been established. System will be revised after initial products are distributed and tested within NJDEP.
3.2.7	Distribution of information products within NJDEP according to approved schedule.	Pending	
3.2.8	Prepare preliminary data analysis report at completion of Phase II	Completed 4-20-73	
3.2.9	Prepare a revised data analysis plan for Phase III	Pending	
3.2.10	Preliminary data analysis report & revised data analysis plan sent to NASA	Pending	
3.2.11	Finalize format and content of information products package for Phase III	Pending	
	PHASE III		
3.3.2	Modify data analysis procedures	Pending	

TASK	HEADING	STATUS	COMMENTS
3.3.3	Distribute final information products on a routine basis.	Pending	
3.3.4	Work closely with NJDEP to best apply and distribute information products and document benefits derived thereof	Pending	
4.3	Prepare final report	Underway	Sections of the final report are being written as the experiment progresses.
4.4	Prepare a program for continuing ERTS applications within New Jersey	Pending	
4.5	Prepare coastal states briefing package	Pending	